Summary of Detected Analytes

Analytica Alaska Southeast

Workorder (SDG): J0303128

Project: NPDES Quarterly Seawater
Client: Kennecott Greens Creek Mining
Client Project Number: none

Client Sample Name: 104-5 01

Matrix: Ocean Water Collection Date: 3/26/2003 2:09:00PM

Analyte	CASNo	Result	PQL	Units	Analysis Date:	Flags	Analyst	Method
Total Suspended Solids		26	4.0	mg/L	3/27/2003 1:30:54PM		LS	160.2-Residue, Gravimetric, Non-filter
pH		7.84	0.10	pH	3/27/2003 3:10:25PM		LS	150.1 - pH, Electrometric - (pH)
Turbidity		0.70	0.10	NTU	3/27/2003 11:15:00AM		SW	180.1 - Turbidity, Nephelometric - (Tu
Cyanide		<0.0040	0.0040	mg/L	4/1/2003 3:40:53PM		ksb	SM4500-CNE - Cyanide, Colorimetric M

Client Sample Name: 106-5 02

Matrix: Ocean Water Collection Date: 3/26/2003 2:48:00PM

Analyte	CASNo	Result	PQL	Units	Analysis Date:	Flags	Analyst	Method
Total Suspended Solids		47	4.0	mg/L	3/27/2003 1:30:54PM		LS	160.2-Residue, Gravimetric, Non-filter
pH		7.84	0.10	pH	3/27/2003 3:10:25PM		LS	150.1 - pH, Electrometric - (pH)
Turbidity		0.43	0.10	NTU	3/27/2003 11:15:00AM		SW	180.1 - Turbidity, Nephelometric - (Tu
Cyanide		<0.0040	0.0040	mg/L	4/1/2003 3:40:53PM		ksb	SM4500-CNE - Cyanide, Colorimetric M

Client Sample Name: 107-5 03

Matrix: Ocean Water Collection Date: 3/26/2003 2:25:00PM

Analyte	CASNo	Result	PQL	Units	Analysis Date:	Flags	Analyst	Method
Total Suspended Solids		21	4.0	mg/L	3/27/2003 1:30:54PM		LS	160.2-Residue, Gravimetric, Non-filter
pH		7.83	0.10	pH	3/27/2003 3:10:25PM		LS	150.1 - pH, Electrometric - (pH)
Turbidity		0.59	0.10	NTU	3/27/2003 11:15:00AM		SW	180.1 - Turbidity, Nephelometric - (Tu
Cyanide		<0.0040	0.0040	mg/L	4/1/2003 3:40:53PM		ksb	SM4500-CNE - Cyanide, Colorimetric M

Client Sample Name: 108-5 04

Matrix: Ocean Water Collection Date: 3/26/2003 2:47:00PM

Analyte	CASNo	Result	PQL	Units	Analysis Date:	Flags	Analyst	Method
Total Suspended Solids		24	4.0	mg/L	3/27/2003 1:30:54PM		LS	160.2-Residue, Gravimetric, Non-filter
pH		7.83	0.10	pH	3/27/2003 3:10:25PM		LS	150.1 - pH, Electrometric - (pH)
Turbidity		0.41	0.10	NTU	3/27/2003 11:15:00AM		SW	180.1 - Turbidity, Nephelometric - (Tu
Cyanide		<0.0040	0.0040	mg/L	4/1/2003 3:40:53PM		ksb	SM4500-CNE - Cyanide, Colorimetric M

Kennecott Minerals

LGN: J0303128
CSN:

Chain of Custody Record / Analysis Request

Company Name:	K.G.C.M.C. Greens Creek Mine	Project Name:	NPDES Quarterly Seawater
Company Address:	P.O.Box 32199 Juneau, AK 99803	Report To:	Bill Oelklaus
		Sampler:	MTM, SLH
		P.O.Number	
Telephone:	(907) 790-8472 / 8473 / 8470		
Fax:	(907) 790-8478 or 789-8119		

Sample I.D.	Date Collected	Time Collected	Matrix Water / Soil	# Containers: 1lt. White	1lt. Green	500ml. White		TSS	pH	Turbidity	T. Cn							pH < 2	RUSH (see below)	LAB I.D.
104-5'	03-26-03	14:09	Water		1	1		X	X	X	X									1
106-5'	03-26-03	14:48	Water		1	1		X	X	X	X									2
107-5'	03-26-03	14:25	Water		1	1		X	X	X	X									3
108-5'	03-26-03	14:47	Water		1	1		X	X	X	X									4

Comments:

Lab sent to: Analytica Alaska S.E.

Deliverables
- [ ] Level 1
- [ ] ADEC Format
- [ ] ACOE
- [ ] Other:_____
- [ ] EDD-Format:_____Specify

Turnaround Time
- [ ] 2 Business Days
- [ ] 5 Business Days
- [X] 10-15 Business Days
- [ ] Other:____# Business Days

RELINQUISHED BY SAMPLER:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:	Condition of Sample Containers:
Signature:	Signature: Kevcia Schroeder	Signature:	Signature:	Temp Received: 5.5 °C
Printed Name: Steven Hutson	Printed Name: Kevcia Schroeder	Printed Name:	Printed Name:	# of Coolers: 1 bucket
Firm: KGCMC	Firm: AAI SE	Firm:	Firm:	Seals Intact: no seal
Date / Time: 03-26-03 / 19:30	Date / Time: 3/27/03 0800	Date / Time:	Date / Time:	Page ____ of ____

ANALYTICA

Cooler Receipt Form

Client: Kennecott Greens Creek Min Client Code: 012040 Order #: J0303128
Project: NPDES Quarterly Seawater

Cooler ID: 1

A. Preliminary Examination Phase: Date cooler opened: 3/27/2003
Cooler opened by: KS Signature: Kevin Schroeder

1. Was airbill Attached?	N/A	Airbill #:		Carrier Name:	Client
2. Custody Seals?	No	How many?	0	Location:	Seal Name:
3. Seals intact?	N/A				
4. Screened for radiation?	No				
5. COC Attached?	Yes	Properly Completed?	Yes	Signed by AEL employee?	Yes

6. Project Identification from custody paper: NPDES Quarterly Seawater
7. Preservative: None Temperature: 5.5

Designated person initial here to acknowledge receipt: _____ Date: 3/27/3

COMMENTS: Bucket sealed wih lid. Had to cut open with knife.

B. Log-In Phase: Samples Log-in Date: 3/27/2003 Log-in By: KU Signature:

1. Packing Type:	Other		
2. Were samples in separate bags?	No		
3. Were containers intact?	Yes	Labels agree with COC?	Yes
4. Number of bottles received:	8	Number of samples received:	4
5. Correct containers used?	Yes	Correct preservatives added?	Yes
6. Sufficient sample volume?	Yes		
7. Bubbles in VOA samples?	N/A		

8. Was Project manager called and status discussed? No
9. Was anyone called? No Who was called? _____ By whom? _____ Date: _____

COMMENTS:

May 28, 2003

Battelle
... Putting Technology To Work

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Telephone: (360) 681-3627
Facsimile: (360) 681-3699

Mr. Bill Oelklaus
Kennecott Greens Creek
P.O. Box 32199
Juneau, AK 99803-2199

Dear Bill:

Enclosed are the results for trace metals in Green's Creek (Hawk Inlet) seawater samples received on March 28, 2003. Holding times were met for all samples. The acceptable cooler temperature range was met as the samples were preserved in the field.

These results are elevated relative to those from previous years and indicate contamination from an unknown source. There are many scenarios that would explain these results but further testing is needed. Metals were detected in the procedural blank, except Cd. These metals are routinely found in very low concentrations in the reagents used to chelate the metals as part of the digestion process. The SRM and duplicate results were within Battelle's default criteria of ±20%, except CASS-4 for Cu, Cd and Pb. If these metals SRM results are blank corrected the Cu falls into the acceptable range (1% difference), as does Cd (11% difference) and Pb is less than the detection limit. SRM 1640 results are provided for these metals to show the instrument was operating properly and recoveries were within the acceptable criteria. Therefore, no corrective action was taken. Matrix spikes were within our criteria of ±25% for all metals, except Pb where the spiking level was inappropriate to the sample concentration. Duplicate results were within the criteria of ±20%, except Pb.

The field blank was provided as part of the requirement for your permit. Results have been included in the accompanying report. A lab blank was not available for this sampling. I have enclosed a disk containing the data in Excel format, as well as CSV format to provide ease when entering into your database.

A cost breakdown has been included with these data and appears in Table 1. Our contracts department will send you an invoice for these costs shortly. If you have any questions or comments concerning the data or cost breakdowns, please don't hesitate to contact me at 360-681-3627 or email: l.bingler@pnl.gov at anytime. These samples will be disposed of on June 16th, unless otherwise advised by you.

Clearance of CHEMISTRY DATA REPORTS

Marine Sciences Laboratory Sequim, WA 98382	Date Requested: 5/28/2003 Data Entry: LSB

CHEMICAL ANALYSES OF: Metals in Water

803GC

Lead Author: Linda S. Bingler	Other Authors (if applicable)

Green's Creek Seawater - first quarter 2003

I HAVE READ THE ATTACHED DOCUMENT(S)

Author: Linda S. Bingler Date 5-28-03

QA Reviewer: D. Coffey Date 5-28-03

Peer Reviewer: Date 5-28-03

I certify that this data is in compliance with requirements specified in NPDES Permit No. AK-004320-6.

Richard M. Ecker Date 5/28/03

RETURN COMPLETED FORM, ALONG WITH FINAL TABLE REPORT TO:

DATA ENTRY or AUTHOR
Linda Bingler

COMMENTS:

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 683-4151

Report Date: 5/28/03

TRACE METAL CONCENTRATIONS IN GREENS CREEK SEAWATER SAMPLES

Samples received: 3/28/03

(concentrations in μg/L (not blank corrected))

Lab Sample Lab I. Number	Sample Identifier	Sampling Date	Date Received	Date Analyzed	Parameter Number	Analysis Method	Value	Detection Limit	Parameter Description	Flag	Sample Description	RPD	Percent Recovery	Flag
SAMPLE RESULTS														
MSL 803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1119	1640m	1.99	0.024	TRM Cu-ICP/MS		Sample	N/A	N/A	
MSL 803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1094	1640m	9.98	0.245	TRM Zn-ICP/MS		Sample	N/A	N/A	
MSL 803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1113	1640m	0.279	0.058	TRM Cd-ICP/MS		Sample	N/A	N/A	
MSL 803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1114	1640m	7.13	0.020	TRM Pb-ICP/MS		Sample	N/A	N/A	
MSL 803GC*241	104-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.00558	0.00005	Total Hg-CVAF		Sample	N/A	N/A	
MSL 803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1119	1640m	0.676	0.024	TRM Cu-ICP/MS		Sample	N/A	N/A	
MSL 803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1094	1640m	6.11	0.245	TRM Zn-ICP/MS		Sample	N/A	N/A	
MSL 803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1113	1640m	0.121	0.058	TRM Cd-ICP/MS		Sample	N/A	N/A	
MSL 803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1114	1640m	5.33	0.020	TRM Pb-ICP/MS		Sample	N/A	N/A	
MSL 803GC*242	106-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.00244	0.00005	Total Hg-CVAF		Sample	N/A	N/A	
MSL 803GC*243	107-5'	3/26/03	3/28/03	4/28/03	1119	1640m	0.603	0.024	TRM Cu-ICP/MS		Sample	N/A	N/A	
MSL 803GC*243	107-5'	3/26/03	3/28/03	4/28/03	1094	1640m	2.42	0.245	TRM Zn-ICP/MS		Sample	N/A	N/A	
MSL 803GC*243	107-5'	3/26/03	3/28/03	4/28/03	1113	1640m	0.148	0.058	TRM Cd-ICP/MS		Sample	N/A	N/A	
MSL 803GC*243	107-5'	3/26/03	3/28/03	4/28/03	1114	1640m	0.500	0.020	TRM Pb-ICP/MS		Sample	N/A	N/A	
MSL 803GC*243	107-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.00160	0.00005	Total Hg-CVAF		Sample	N/A	N/A	
MSL 803GC*244	108-5'	3/26/03	3/28/03	4/28/03	1119	1640m	0.575	0.024	TRM Cu-ICP/MS		Sample	N/A	N/A	
MSL 803GC*244	108-5'	3/26/03	3/28/03	4/28/03	1094	1640m	2.22	0.245	TRM Zn-ICP/MS		Sample	N/A	N/A	
MSL 803GC*244	108-5'	3/26/03	3/28/03	4/28/03	1113	1640m	0.101	0.058	TRM Cd-ICP/MS		Sample	N/A	N/A	
MSL 803GC*244	108-5'	3/26/03	3/28/03	4/28/03	1114	1640m	0.902	0.020	TRM Pb-ICP/MS		Sample	N/A	N/A	
MSL 803GC*244	108-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.00120	0.00005	Total Hg-CVAF		Sample	N/A	N/A	
MSL 803GC*245	Field Blank	3/26/03	3/28/03	4/28/03	1119	1640m	0.387	0.024	TRM Cu-ICP/MS		Sample	N/A	N/A	
MSL 803GC*245	Field Blank	3/26/03	3/28/03	4/28/03	1094	1640m	0.674	0.245	TRM Zn-ICP/MS		Sample	N/A	N/A	
MSL 803GC*245	Field Blank	3/26/03	3/28/03	4/28/03	1113	1640m	0.0771	0.058	TRM Cd-ICP/MS		Sample	N/A	N/A	
MSL 803GC*245	Field Blank	3/26/03	3/28/03	4/28/03	1114	1640m	0.203	0.020	TRM Pb-ICP/MS		Sample	N/A	N/A	
MSL 803GC*245	Field Blank	3/26/03	3/28/03	4/17/03	71900	1631m	0.000364	0.00005	Total Hg-CVAF		Sample	N/A	N/A	
PROCEDURAL BLANK														
MSL Blank	N/A	N/A	N/A	4/28/03	1119	1640m	0.160	0.024	TRM Cu-ICP/MS		Blank	N/A	N/A	
MSL Blank	N/A	N/A	N/A	4/28/03	1094	1640m	0.493	0.245	TRM Zn-ICP/MS		Blank	N/A	N/A	
MSL Blank	N/A	N/A	N/A	4/28/03	1113	1640m	0.00459	0.058	TRM Cd-ICP/MS	U	Blank	N/A	N/A	
MSL Blank	N/A	N/A	N/A	4/28/03	1114	1640m	0.0260	0.020	TRM Pb-ICP/MS		Blank	N/A	N/A	
MSL Blank	N/A	N/A	N/A	4/17/03	71900	1631m	0.000103	0.00005	Total Hg-CVAF		Blank	N/A	N/A	

BATTELLE MARINE SCIENCES LABORATORY
1529 W. Sequim Bay Road
Sequim, WA 98382
(360) 683-4151

Report Date: 5/28/03

TRACE METAL CONCENTRATIONS IN GREENS CREEK SEAWATER SAMPLES

Samples received: 3/28/03

(concentrations in μg/L (not blank corrected))

Lab I.D.	Lab Sample Number	Sample Identifier	Sampling Date	Date Received	Date Analyzed	Parameter Number	Analysis Method	Value	Detection Limit	Parameter Description	Sample Flag	Sample Description	RPD	Percent Recovery	Flag
CERTIFIED REFERENCE MATERIAL RESULTS															
MSL	CASS-4	N/A	N/A	N/A	4/28/03	1119	1640m	0.749	0.024	TRM Cu-ICP/MS		SRM	27%	N/A	#
MSL	CASS-4	N/A	N/A	N/A	4/28/03	1094	1640m	0.371	0.245	TRM Zn-ICP/MS		SRM	3%	N/A	
MSL	CASS-4	N/A	N/A	N/A	4/28/03	1113	1640m	0.0334	0.058	TRM Cd-ICP/MS		SRM	28%	N/A	#
MSL	CASS-4	N/A	N/A	N/A	4/28/03	1114	1640m	0.0267	0.020	TRM Pb-ICP/MS		SRM	172%	N/A	#
MSL	1640	N/A	N/A	N/A	4/28/03	1119	1640m	87.3	0.024	TRM Cu-ICP/MS		SRM	2%	N/A	
MSL	1640	N/A	N/A	N/A	4/28/03	1113	1640m	24.6	0.058	TRM Cd-ICP/MS		SRM	8%	N/A	
MSL	1640	N/A	N/A	N/A	4/28/03	1114	1640m	28.1	0.020	TRM Pb-ICP/MS		SRM	1%	N/A	
MSL	1641d	N/A	N/A	N/A	4/17/03	71900	1631m	1480	0.00005	Total Hg-CVAF		SRM	7%	N/A	
MATRIX SPIKE RESULTS															
MSL	803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1119	1640m	3.98	0.024	TRM Cu-ICP/MS		MS	N/A	100%	
MSL	803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1094	1640m	11.9	0.245	TRM Zn-ICP/MS		MS	N/A	96%	
MSL	803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1113	1640m	2.12	0.058	TRM Cd-ICP/MS		MS	N/A	92%	
MSL	803GC*241	104-5'	3/26/03	3/28/03	4/28/03	1114	1640m	7.40	0.020	TRM Pb-ICP/MS		MS	N/A	14%	#
MSL	803GC*243	107-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.0120	0.00005	Total Hg-CVAF		MS	N/A	99%	
REPLICATE RESULTS															
MSL	803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1119	1640m	0.798	0.024	TRM Cu-ICP/MS		Duplicate	17%	N/A	
MSL	803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1094	1640m	6.25	0.245	TRM Zn-ICP/MS		Duplicate	2%	N/A	
MSL	803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1113	1640m	0.117	0.058	TRM Cd-ICP/MS		Duplicate	3%	N/A	
MSL	803GC*242	106-5'	3/26/03	3/28/03	4/28/03	1114	1640m	4.01	0.020	TRM Pb-ICP/MS		Duplicate	28%	N/A	#
MSL	803GC*243	107-5'	3/26/03	3/28/03	4/17/03	71900	1631m	0.00172	0.00005	Total Hg-CVAF		Duplicate	7%	N/A	

= Outside QC limits.

U = Not detected at or above the detection limit.

N/A = Not applicable/analyzed.

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 603 Sample No(s): 241 -245 Project Manager: LB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: Sea WAT WP# W39822

Yes	No	
	X	Navy-type Project (requires high-level sample tracking procedures)
	X	Filter Samples: Amount: Entire sample Half of sample
	X	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Lab# 130)
	X	Special instructions:

Sample Preservation Instructions:

Date To Archive: Date To Dispose:

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
X			Was a custody seal present? (Client tape)
X			Was the custody seal intact?
	X		Was cooler(s) temperature(s) within acceptable range of 4±2°C? 9.05 °C OK - Samples additional were in field ice
			(if multiple coolers, note temp. of each) °C
		X	Was Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)?
			Comment/Remedy:
X			Were all chain of custody forms signed and dated?
	X		Were samples filtered at MSL?

Sample condition(s): Acceptable Other (explain):

Container type: Teflon Poly Glass Spex Other:

Notes:

Completed By: Date/Time: 3/26/03 1330

SAMPLE PRESERVATION

- [ ] Sample(s) were preserved at MSL
- [x] Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)
- [ ] Random pH checked for ~10% of samples (use dip paper) Sample IDs:
- [ ] Complete pH check required for project (use pH meter and record on pH Record form)

If preservation necessary, record Acid Lot#

Type:
- [ ] 0.2% HNO3 Notes:
- [ ] 0.5% HCl (Hg samples) Notes:
- [ ] Refrigerate/Freeze Notes:
- [ ] Other Notes:

Completed By: Date/Time: 3-31-03 1500

Kennecott Minerals

LGN:
CSN:

Chain of Custody Record / Analysis Request

Company Name:	K.G.C.M.C. Greens Creek Mine
Company Address:	P.O.Box 32199 Juneau, AK 99803
Telephone:	(907) 790-8472 / 8473 / 8470
Fax:	(907) 790-8478 or 789-8119

Project Name: NPDES Quarterly Seawater
Report To: Bill Oelklaus
Sampler: MTM, SLH
P.O.Number

Sample I.D.	Date Collected	Time Collected	Matrix Water / Soil	# Containers 1lt. White	Metals	pH < 2	RUSH (see below)	LAB I.D.
104-5'	03-26-03	14:09	Water	1	X			241
106-5'	03-26-03	14:48	Water	1	X			242
107-5'	03-26-03	14:25	Water	1	X			243
108-5'	03-26-03	14:47	Water	1	X			244
Field Blank								245
~~Lab Blank~~ 3-31-03								
3-31-03								

Comments:
Field blank was taken at site 106-5

Lab sent to: Analytica Alaska S.E.

Deliverables
- ☐ Level 1
- ☐ ADEC Format
- ☐ ACOE
- ☐ Other:_____
- ☐ EDD-Format:_____Specify

Turnaround Time
- ☐ 2 Business Days
- ☐ 5 Business Days
- ☐ 10-15 Business Days
- ☐ Other:____# Business Days

RELINQUISHED BY SAMPLER:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:	Condition of Sample Containers:
Signature:	Signature: 1330 3/29/03	Signature:	Signature:	Temp Received: _____ °C
Printed Name: Steven Hutson	Printed Name:	Printed Name:	Printed Name:	# of Coolers: _____
Firm: KGCMC	Firm:	Firm:	Firm:	Seals Intact: _____
Date / Time: 03-26-03 / 19:30	Date / Time:	Date / Time:	Date / Time:	Page _____ of _____